1. 🕮General

1.1 Overview

Thank you for selecting the MX-120 product.The product can be used to provide E1 communication channels over Ethernet or IP networks.

The MX-120 has many optional parameters, which can be modified by the user to suite different application requirements. Please read this manual carefully before installing the product.

It is well known that the E1 signal comes from PCM technology which is TDM in nature. It transmits information in a constant bit rate of E1_2048kbit/s, TDM technology occupies fixed transmission bandwidth, with QoS features suitable for real-time applications such as voice and video. The QoS features include short and stable transmission delay, low jitter and wander, etc.

On the other hand, Ethernet is based on statistical multiplexing, transmitting and exchanging information in packets. It does not take up a fixed transmission bandwidth, which is good for achieving higher bandwidth utilization. But Ethernet technology does not provide adequate QoS for real time applications.

Until recently, voice and data were, and still are to a large extent, transported over two separate networks. But the requirement for both types of information to be carried over a unified network is growing rapid. Packets over SONET/SDH techniques to integrate date into the TDM network have been around for many years. But for voice over packet based data networks, most of the efforts are spent on creating special equipment that packets voice or video signals, such as VoIP techniques.

However, to take advantage of the data network, it is neither cost effective, nor necessary to hastily replace all the TDM based equipment with new packet based equipment. The MX-120 can be used to emulate transparent E1 channels over an Ethernet with adequate QoS, so that most of the existing E1based applications can be readily setup over Ethernet LANs and WANs. One particular suited application is to build E1 links with low cost wireless LAN bridges, replacing much more costly microwave radios.

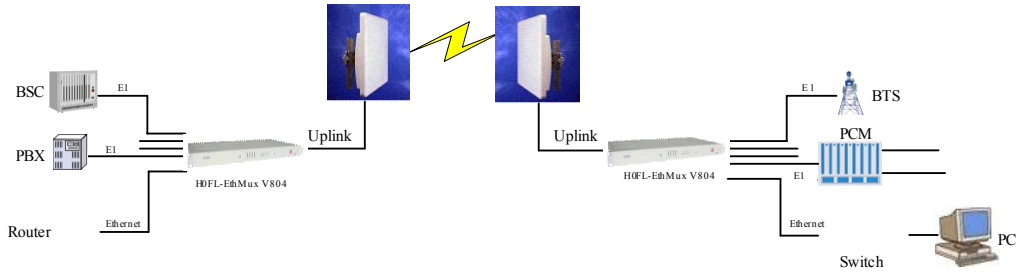
1.2 Features

- User-friendly Web server supported for easy setup and maintenance
- Support SNMP V1 and V2 network management
- Point to point and point to multipoint supported
- Uplink ports 1+1 backup supported

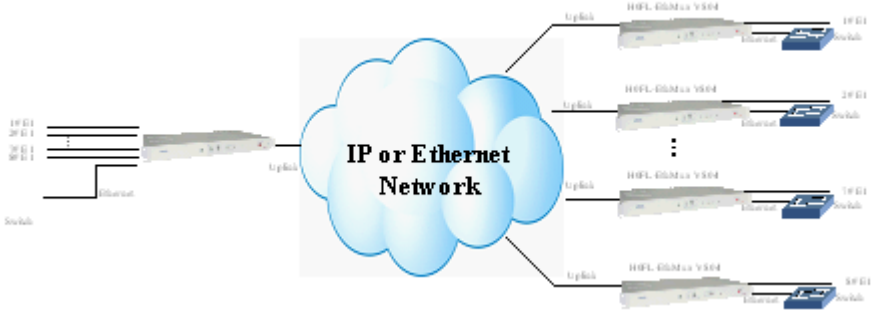
- Four E1 Ports supported
- Stable E1 clock recovery, low jitter and wander
- Low processing delay for E1 channels, high bandwidth usage efficiency
- Resist to packet loss, with PCM frame synchronization protection
- User definable encapsulation packet size for different application
- Support Ethernet encapsulation and UDP/IP protocol encapsulation
- Support VLAN settings for E1 service and in band VLAN management.
- Enough jitter buffer to resist packet delay variation (PDV)
- Local Ethernet port throughput limiting, assuring E1 QoS
- Local and remote E1 LOS and AIS and packet loss indication for trouble-shooting and maintenance
- Support cascade concatenate for more than 4 E1 ports

1.3 Applications

MX-120 is used to setup 1~4 transparent E1 channels over LAN or IP networks, as depicted in Fig. 1.3-1.



Point to Point Application



Point to Multipoint Application

Fig. 1.3-1 MX-120 application paradigm

In the figure, a pair of MX-120 create transparent E1 channels over the

packet network, providing connections between the PBX and telephone exchange, or other terminal devices. At the same time, computers talk to each other through the local Ethernet ports on the MX-120 s. This configuration guarantees that the E1 channels get higher priority over computer data for maximum QoS.

The most widely used application of MX-120 is to set up point to point wireless E1 links using low cost wireless LAN bridges. MX-120 can work with most LAN bridges on the market. It may be necessary to adjust different parameters such as packet size and packet jitter absorption buffer size for best operation for different LAN bridges.

Be aware that wireless LAN bridges have a very limited bandwidth. If Ethernet data is to be transferred at the same time, its traffic must be restricted. Otherwise it will affect the E1 packets. Since the LAN bridges usually don't have adequate QoS mechanism to guarantee the E1 priority, it is strongly recommended that the data traffic be routed through the MX-120 local data port, as depicted in Fig. 1.3-2.

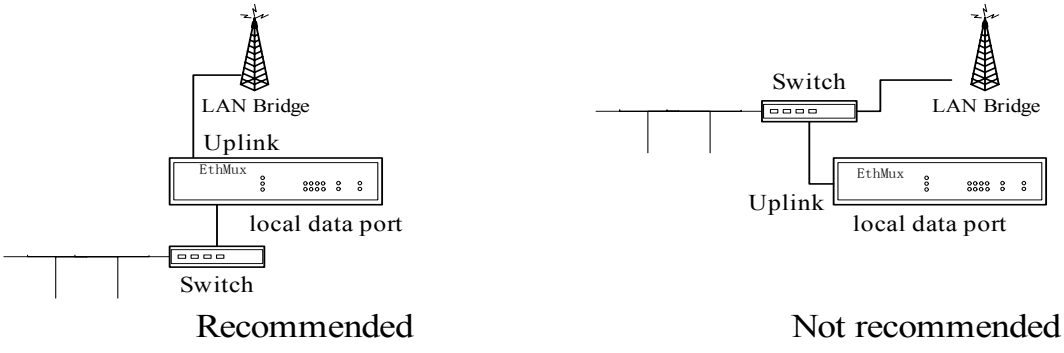


Fig. 1.3-2 preferred connections for LAN traffic

***WARNING*: When connecting to a wireless LAN bridge, the uplink Ethernet cable often connects to the outdoor unit, posing danger to lightning strikes that can seriously damage the equipment. To protect the equipment as well as people, surge protection devices with good earth connection is strongly recommended. Poor earth connection may also hinder the operation of the Ethernet port, causing severe packet losses.**

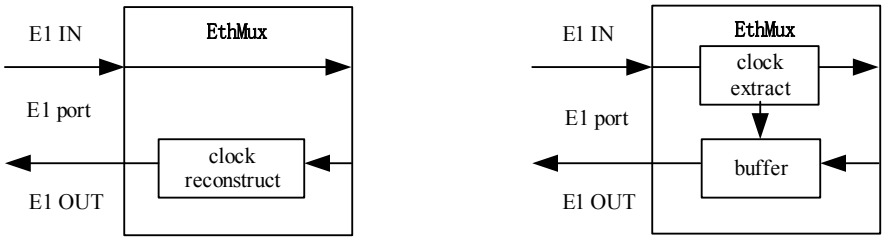
1.4 Timing modes

To emulate a clear E1 channel over a packet network, the MX-120 not only conveys data stream content correctly from the source to the destination, but also passes timing. Packet networks do not provide such built-in timing transparency mechanism as TDM networks do. MX-120 uses its proprietary algorithm to reconstruct the E1 clock at the destination. The recovered clock is of very high quality, with low jitter and wander. Typical frequency offset is within ±5ppm, and jitter is below 0.1UI. It can be adopted in most applications. This timing mode of rebuilding the E1 clock at the destination is called Adaptive Timing.

For applications where separate clock distribution network exists, another

timing mode, Loop back Timing, may be used for maximum clock quality.

The two timing modes of MX-120 are depicted in Fig.1.4-1.



Adaptive Timing Loop back Timing

Fig.1.4-1 E1Timing modes

Correct timing mode setting is important for smooth operations. In most cases, setting both units to adaptive timing mode is sufficient. But sometimes, setting one unit to loop timing mode may work better. For example, setting the MX-120 unit connected with the clock master (such as local exchange) to loop back mode, and the other unit connected with the clock slave (such as PBX or remote module) to adaptive mode, is probably better than setting both to adaptive modes.

One typical error in telecom applications is to connect two communication devices that are both clock slaves. Neither will MX-120 support such operation no mater how the timing modes are set.

Note: that the E1channel emulation takes several minutes to stabilize. During that period, clock drift may exceed the limit, errors and slips may occur.

Various timing schemes are enlisted in Table 1.4-1, for applications depicted in Fig.1.4-2.

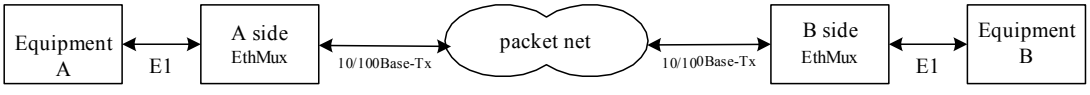


Fig.1.4-2 Timing mode scheme reference diagram

Table 1.4-1 Timing mode schemes

Equipment A clock mode	Equipment B clock mode	A side EthMux V804 Timing mode	B side EthMux V804 Timing mode	Note
master	master	loop back	loop back	Equipment A & B clocks synchronous
		adaptive	adaptive	
master	master	adaptive	adaptive	Equipment A & B clocks plesiochronous
master	slave	loop back	adaptive	

		adaptive	adaptive	
slave	master	adaptive	loop back	
		adaptive	adaptive	
slave	slave			Not allowed

Note that setting both units to adaptive timing mode works well for all the conditions, although the other option may work better.

2. 🕮System architecture

2.1 Block diagram

The internal functional structure of MX-120 is depicted below:

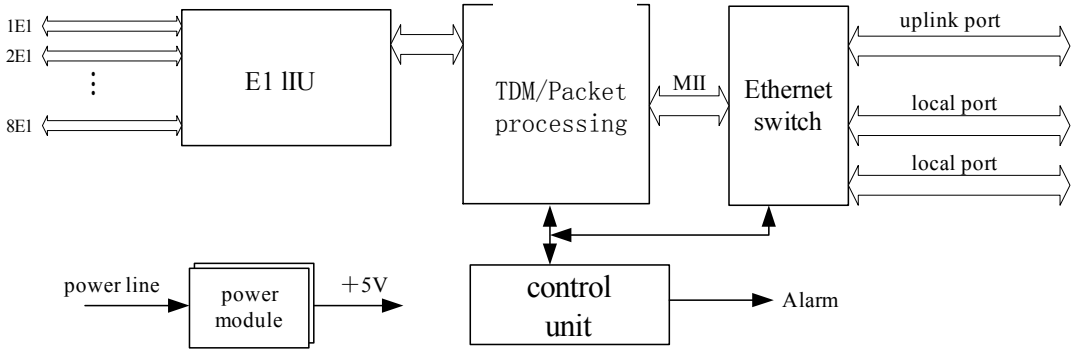


Fig. 2.1-1 Functional diagram

2.2 Description

The heart of MX-120 is the TDM/Packet processing unit. It truncates E1 data stream, putting the data into Ethernet packet with or without IP headers. The packets are passed to the Ethernet switch unit via MII interface, and are sent out adaptive the uplink ports. Ethernet data from two local data port are also sent out through the uplink ports, but with lower priority than those packets containing E1 data.

In the reverse direction, packets from the uplink ports are sorted at the switch unit. All but E1 packets are passed to the local data ports. The packets containing E1 data are sent to the TDM/Packet processing unit for reassembling the original data stream, and recovering the E1 clock which is the key element of the device. Very sophisticated algorithm is used to ensure that the reconstructed clock will meet the stringent requirement of TDM applications. The most important parameters are jitter, wander, and signal delay.

The control unit interfaces with the user through console port so that various operational parameters can be modified.

2.3 Front panel

2.3.1 Diagram

MX-120 is shown in Fig. 2.3.1-1.

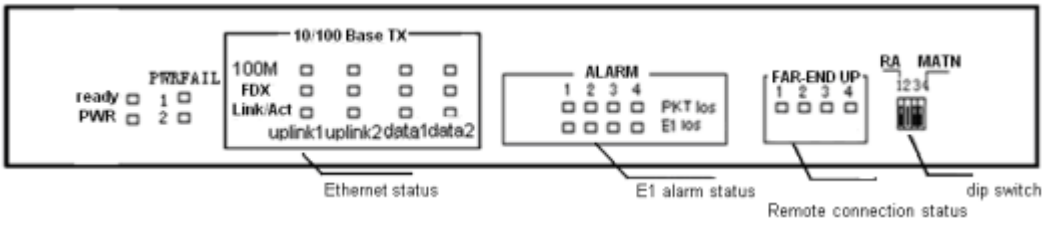


Fig. 2.3.1-1 Front panel of MX-120

2.3.2 LED's

There are 28 LED's on the front panel, divided into 5 groups.

First group: PWR and Ready indicators.

The definition is as below table:

Table 2.3.2-1 PWR and Ready indicators

LED	Color	Definition	Explanation
PWR	G	power indicator	On: Normal Off: Power Off / Failure
Ready	G	operation status	On or off: System abnormal or system initialization. Blink: Normal operation

When power the device on, PWR indicator will be lit, indicator Ready will be on temporarily, the other lights will blink alternately, which indicate the system is starting now.

After a short time(about 60 seconds), light Ready begin to blink, the other light will indicate the state of each ports respectively, which indicate system is working well now.

If the Ready light doesn't blink as above, which indicate the process runs abnormally, please restart the system again.

Second group: PWRFAIL indicators

PWRFAIL lights indicate power failure state, red. The number 1 and 2 denote PWR1 and PWR 2 respectively. The lights will be on if power is failed or it is not used, they will be off if everything runs normally.

Third group: Ethernet ports status indicator.

There are 4 RJ45 Ethernet ports in MX-120 two uplink Ethernet ports (UPLINK1 and UPLINK2) and two local Ethernet ports (DATA1 and DATA2).

Each port has 3 status indicators, from top to bottom, they are speed indication, full/half duplex and link status indication, detailed explanation is as below table:

Table 2.3.2-2 Ethernet indicator

LED	Color	Definition	Explanation
SPD	G	speed indicator	On: 100M Off: 10M
FDX	G	duplex indicator	On: Full duplex Off: Half duplex
Link/Act	G	link activity indicator	On: Link Blink: Data Off: Inactive

Forth group: E1 alarm indicators

This group lights indicate the 4 channels of E1 alarm status and Ethernet transmission quality, definition as Table 2.3.2-3:

Table 2.3.2-3 E1 alarm indicator

LED	Color	Definition	Explanation
LOS 1~4	R	LOS indicator for 4 E1 ports respectively (Local: RA is off. Remote: RA is on.)	On: LOS Off: Normal or disable Blink: AIS
PKTLOS 1~4	R	packet loss indicator	On: Ethernet packet loss Off: Normal Blink: E1 Packet Loss

Fifth group: Far-end equipment link state indicator

FAR-END UP 1~4 are the UP/DOWN status indicators of 1~4 different destination MAC addresses.

Table 2.3.2-4 Far-end equipment link state indicator

LED	Color	Definition	Explanation
Far-end UP n=1~4	G	packet communication status (Number of remote different MACs connected with local. Slave mode n=1, master mode n=2~4, at local end)	On: Normal, Remote MAC attained Off: Remote MAC unattained while ARP is activated or disable

2.3.1 Dip Switches Definition

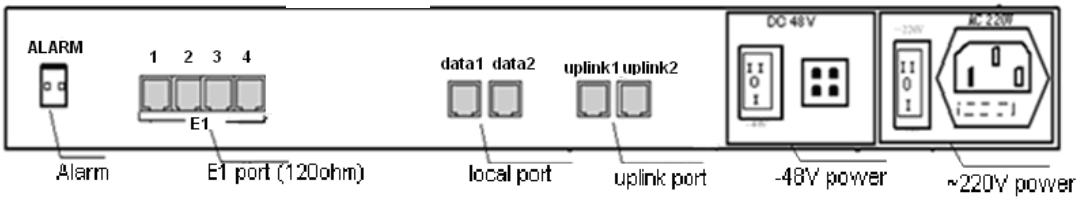
There are four Dip Switches on the front panel, the definition show as Table 2.3.1-1.

Table 2.3.1-1 Dip Switches Definition

Dip	label	Definition
DIP-1	RA	ON: 4 red LEDs indicate remote E1 alarm state OFF: 4 red LEDs indicate local E1 alarm state
DIP-2	Reserved	Reserved
DIP-3	Reserved	Reserved
DIP-4	MATN	ON: Default IP address 192.192.192.192 OFF: User set IP address

2.4 Rear panel

The rear panel of MX-120 is depicted in Fig. 2.4-1.



(b)

2.4.1 System alarm

The MX-120 can output system alarms for maintenance purposes. There are 2 alarm output pins, the Prompt Alarm and the Deferred Alarm, as shown in Fig. 2.4.2-1.

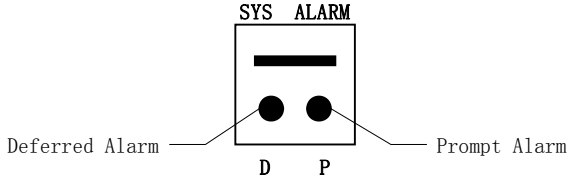


Fig. 2.4.2-1 System alarm port

The alarm conditions for each alarm output are set by the user. The output ports float when no alarm is present, and connect to ground when alarm activates.

2.4.2 E1 Port

There are 4 E1 ports on the rear panel. The E1 ports impendence are E1-120Ω for twisted pair cables or 75Ω for coax. The E1-120Ω RJ45 sockets are default for ports.

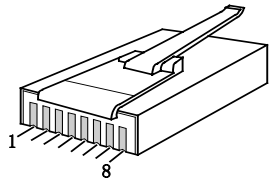


Fig 2.4.3-1 RJ45 connector pin sequence

Table 2.4.3-1 RJ45 120Ω-E1signal definition

Pin	1	2	3	4	5	6	7	8
Signal	—	+	GND	+	—	GND		
	E1-IN			E1-OUT				

2.4.3 Ethernet ports

There are four RJ45 Ethernet ports on the rear panel, 2 for uplink connection to the transmission packet network, 2 local data ports for local computers to access the uplink network.

Table 2.4.4-1 RJ45 socket definition

Pin	1	2	3	4	5	6	7	8
Definition	TxD+	TxD-	RxD+			RxD-		

Note: 10/100Base-Tx interface has HP auto-MDIX function and it can check the transmission and receiving sequence and make configuration. So both MDI and MDI-X interfaces are supported and both cross line and direct line can be selected.

2.4.4 Power

The MX-120 power supply adopts module design. Three kinds of power options are available, AC+DC, AC+AC, DC+DC. It should be specified at the time of purchase.

3. Installation

3.1 Mechanical

MX-120 can be placed at the table top or mounted on a 19” rack. If it is to be mounted on the rack, the four (4) 10mm-high stands should be removed with a screw driver.

The mechanical dimensions of MX-120 are given in Fig.3.1-1.

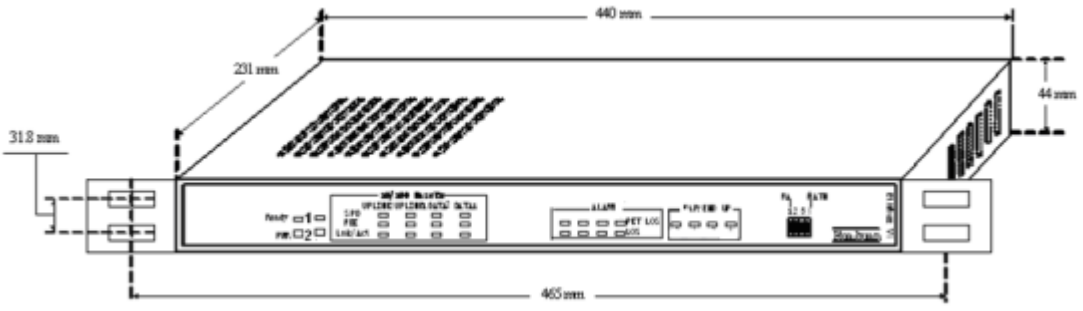


Fig.3.1-1 Mechanical dimensions

3.2 Electrical

3.2.1 Power connection

The MX-120 consumes less than 10W of power.

According to power option, -48V DC or 220V (110V) AC or dual power supply, select the right power supply for the equipment. For the -48V type, connect -48 supply to the power connector -48V port, and ground to the other port. The screws on the power connector must be tightly fastened. For ~220V equipment, connect the device to the ~220V outlet with standard power cord supplied with the equipment. Note that there is a 1A fuse in the ~220V socket which may be replaced when burned. The -48V equipment uses PPTC resettable fuse, no customer replacement is required.

It is recommended to turn off the power switch before connecting or disconnecting the power.

On the left corner of rear panel, a screw is used for connecting the chassis to the protective ground. Be sure to make this connection using a thick wire.

***WARNING*: The system must be securely connected to a good protective ground for safety. All interconnected equipment must be grounded for maintaining signal integrity as well. Ground potential may also damage the interface ports.**

***WARNING*: To avoid electric shock, the ~220V outlet must have good ground.**

3.2.2 E1 connection

The E1 ports on MX-120 are used for connecting to E1 equipment such as the telephone exchange or PCM terminals.

Four E1 Ports Supported. E1 ports impendence are E1-120Ω for twisted pair cables or 75Ω for coax. **The E1-120Ω RJ45 sockets are default for ports.**

The E1-120Ω connection cable is made with RJ45 connectors and a length of 4-pair twisted cable. The cable is not provided with the equipment, and the user is responsible for making such cables in the field with length suitable for a particular installation. The signal definition is given in Table 3.2.2-1, and pin order is depicted in Fig. 3.2.2-1. Note that pin-1 and pin-2 should use the same twisted pair, so should pin-4 and pin-5.

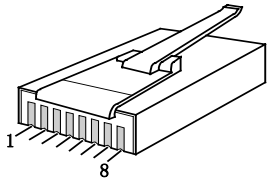


Fig. 3.2.2-1 RJ45 pin order

Table 3.2.2-1 120Ω-E1 signal definition

Pin	1	2	3	4	5	6	7	8
Signal	-	+		+	-			
	E1－IN		GND	E1－OUT		GND		

The RJ45 sockets are default for E1-120Ω, the 4-jumpers of CNM26, CNM25, CNM24, CNM20 in EthMux V804 board are jumped 1-2.

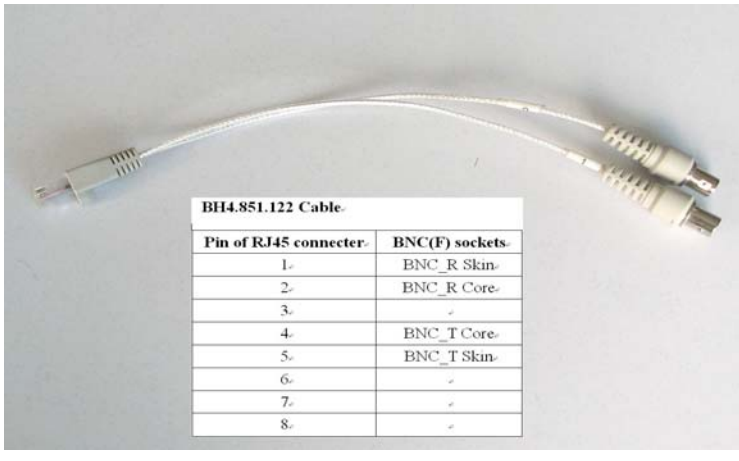


Fig. 3.2.2-2 75Ω converting cable

The cable No. **BH4.851.122** is for one RJ45 connecter to two BNC (F) sockets conversion cable, the 4-jumpers of CNM26, CNM25, CNM24, and CNM20 in EthMux V804 board are jumped 2-3. It is optional for customs.

E1 service can set the actual service quantity by NMS, set the exact E1 channels received by local equipment from remote equipment, realizing E1 service one point to multi-point unidirectional transmission function.

By NMS, E1ports provide local loop back and remote loop back, 4 E1 ports loop

back can be set independently, and by the dip RA on front panel E1 indicators can be controlled to indicate local or remote ports LOS and AIS status. The local and remote loop back definition is shown as Fig 3.2.2-3:

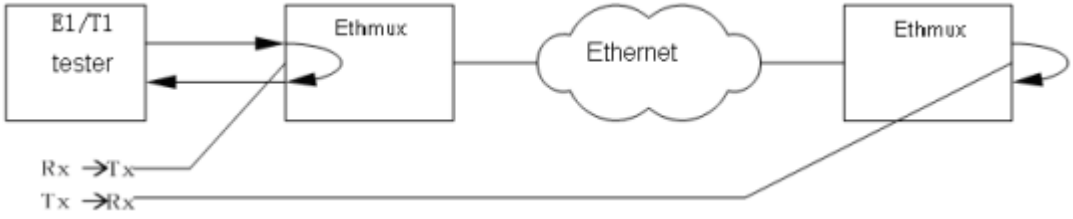


Fig 3.2.2-3 E1 loop back

Rx→Tx can test E1 connection cable, and Tx→ Rx is used to test the whole circuit including MX-120 in the two ends and the link between them.

3.2.3 Ethernet connection

Connect the uplink Ethernet port to the Ethernet transport network, such as the wireless LAN bridge, and connect the local data port to computers or an Ethernet switch for local data applications.

The signal definition of the two local Ethernet ports is given in Table 3.2.3-1.

Table 3.2.3-1 Ethernet signal definition

Pin	1	2	3	4	5	6	7	8
Signal	RxD+	RxD-	TxD+			TxD-		

Note: The ports confirm to HP auto-MDIX spec. It will automatically adapt to parallel or crossed cables.

The signal definition of the uplink Ethernet ports is given in Table 3.2.3-2.

Table 3.2.3-2 Ethernet signal definition

Pin	1	2	3	4	5	6	7	8
Signal	RxD+	RxD-	TxD+	GND	GND	TxD-	GND	GND

Note: The uplink port link parallel cable to LAN bridge.

***WARNING*: When connecting to a wireless LAN bridge, the uplink Ethernet cable often connects to the outdoor unit, posing danger to lightning strikes that can seriously damage the equipment. To protect the equipment as well as people, surge protection devices with good earth connection is strongly recommended. Poor earth connection may also hinder the operation of the Ethernet port, causing severe packet losses.**

4. 🕮Common faults

This paragraph describes common mistakes and faults that may occur during installation and maintenance. Please seek support from Beijing Huahuan Electronics Co., Ltd for other problems.

4.1 E1 Alarms

There are two groups of LEDs, PKT LOS and LOS for E1 alarms LEDs.

When E1 LOS LED is on, loss of E1 signal fault is detected by EthMux. Possible causes include:

- The downstream equipment such as telephone exchange or PCM terminal is powered off.
- The E1 cable connection looses or broken.

E1 LOS LED blinks when respective input E1 signal is AIS, i.e. the content of E1 data is all 1's. Such alarm indicates fault conditions on the part of the downstream equipment.

E1 LOS site is controlled by Dip Switch RA state. When RA Dip Switch ON, the red LEDs indicate **remote** E1 LOS state. When RA Dip Switch OFF, the red LEDs indicate **local** E1 LOS state.

The E1 PKT LOS lights are packet loss indicator, On for Ethernet packet loss, Blink for E1 Packet Loss, Off for Normal.

4.2 Lnk/Act LED off

Lnk/Act LED off means the corresponding Ethernet link is not working. Check the Ethernet cable connection, and the status of the device on the other end of the cable.

4.3 Ready LED does not blink

After power on, the Ready LED should start to blink. If not, try switch power off and on again. If this error persists, call for support.

4.4 Cannot set up E1channel

4.4.1 Same LAN domain

When two MX-120 s are within the same Ethernet broadcast domain, try following.

Check if the transmission network is on.

Check that the network will pass broadcast packets. For a network that suppresses broadcast packets, as some of the wireless LAN bridges do, disable ARP

and manually setup local and remote MAC's.

Check that there is no MAC address conflict on the LAN.

Check that the transmission network has enough bandwidth (more than 2.5Mbps duplex).

4.4.2 Different LAN domain

When two MX-120 s are in different Ethernet broadcast domains, IP headers must be used, and packets will be routed by a gateway router, try following.

Check if the default gateway IP is defined correctly.

Check if the local and remote IP is set correctly.

Check for any conflicts in IP or MAC addresses.

Make sure the transmission network has enough bandwidth.

4.5 Downstream reporting slips

Check if the downstream equipment has correct clock mode. At least one of them must be clock master. Set the EthMux on master side to loop back timing.

If the downstream equipment on both sides is not synchronized, slips are not avoidable.

At the transition time after power on or reapplying the E1signal, slips and errors are acceptable. Such transition may take several minutes.

5. 🕮Web Manager

Both Web Server and SNMP management are supported through anyone of two user data ports of MX-120

The management has four sections: Status, Line Test, Configuration and System. User name and password are required to enter the sections of Line Test Configuration and system. Both the default user name and password are "root". Customers can modify the user name and password in the System section.

Note that the modifications of system will be valid after submit and reboot, while the modifications of Line Test (E1 loop-back setting) and Configuration can be valid only after submit.

5.1 Show current status menu

After input the IP address, status information of MX-120 will be displayed such as hardware version, software version, IP address, subnet mask, gateway address and MAC address. Details are shown in fig.5.1-1.

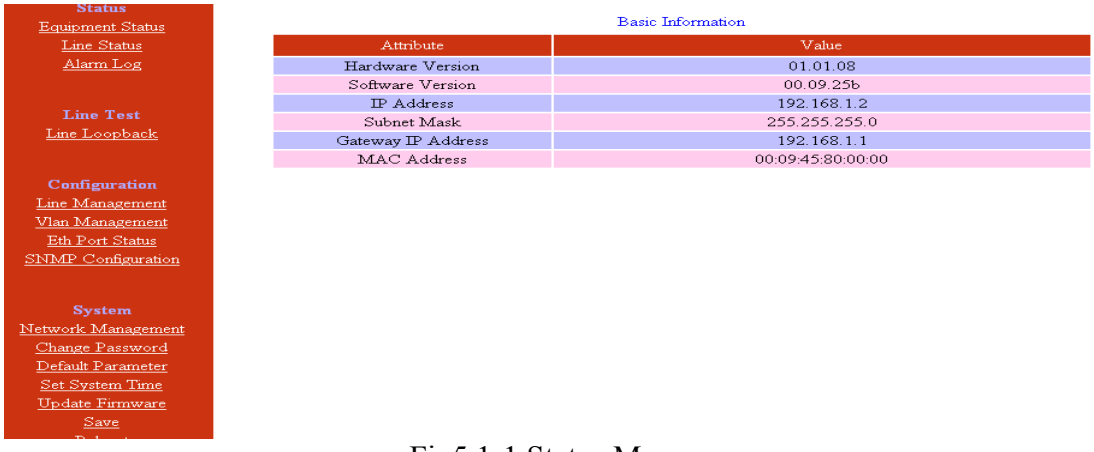


Fig5.1-1 Status Menu

The interface of line status will be displayed by clicking item Line Status on the left, including alarm information LOS, AIS, loop back setting status (shown as Fig5.1-2), and power status about dual power supply failure. All the alarm information can be masked by Alarm Mask followed. If the Alarm mask is enabled, the corresponding alarm will not be shown in the alarm log, panel indicators and SNMP.

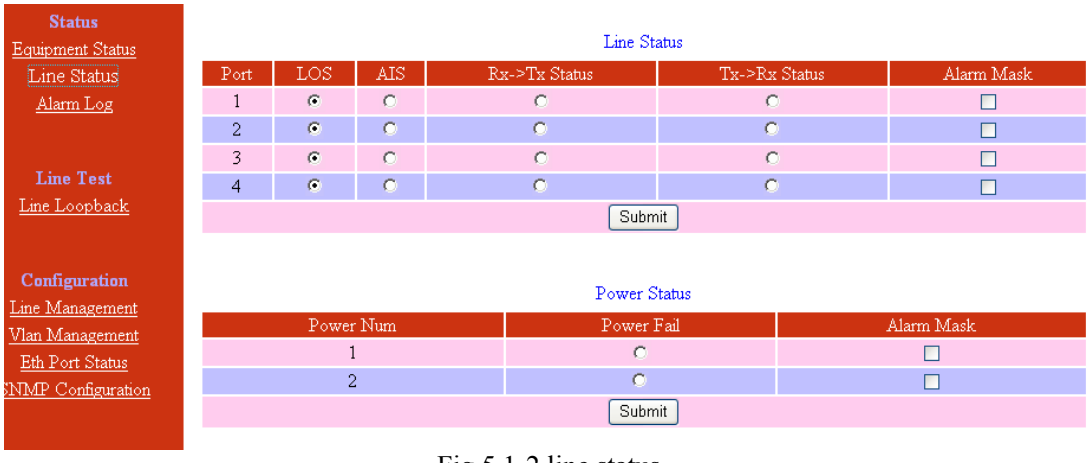


Fig 5.1-2 line status

Click Alarm Log to enter the log menu. Users can select current alarm or history alarm. Following alarm information will be displayed: LOS and AIS alarm of E1, power failure, can not receive data packet, service packet loss, addressing failure of remote equipment, down alarm of uplink and data port.

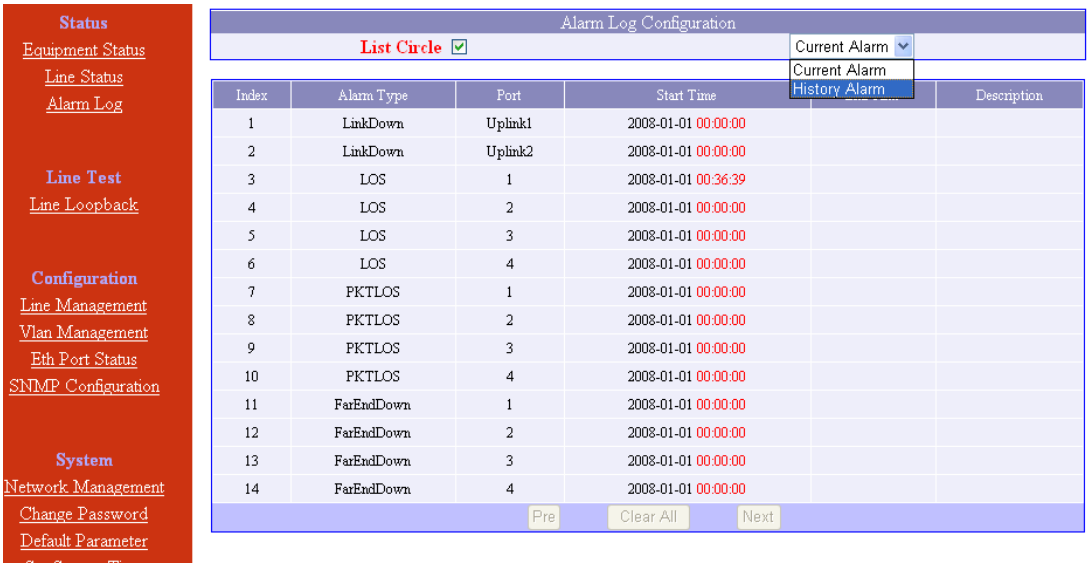


Fig 5.1-3 alarm log

5.2 Line Test

Loop back controls provide E1 line loop test function.

Click on E1 Loop back option will bring the window as fig5.2-2. E1 setting can be valid after submit but not saved, that is, Four E1s will not loop back after restart.

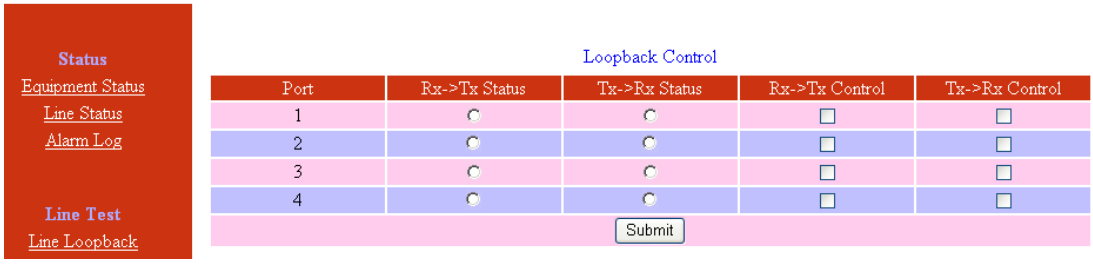


Fig.5.2-1 E1 Loop-back Management

5.3 Configuration

5.3.1 Service configuration and parameters instruction

This section includes E1 service management, VLAN management, Ethernet Management, SNMP configuration. Every section has many parameters setting. As Fig5.3-1.

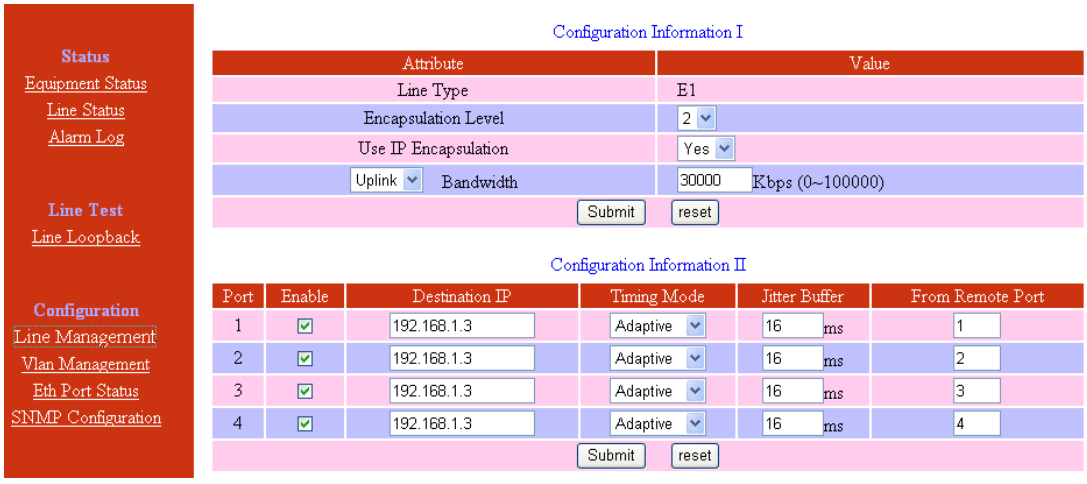


Fig.5.3-1 E1 service Management

Table 5.3-1 E1 service management parameters

Parameters		Selections	Explanations
E1 Management	E1	E1	E1 service
	Encapsulation Level	1~5	E1 data size encapsulated in E1， N=1~5 optional，corresponding to 256×Nbyte（E1）.The bigger the packet is the more data each packet encapsulated, the lower overhead it has. Bandwidth efficiency will be raised and delay will be increased. Default :2
	Use IP Encapsulation	Yes	Yes：IP encapsulation，source and destination IP address should be set. Bandwidth efficiency will be reduced (default)No：do not use IP encapsulation，high bandwidth efficiency
		No	
	Bandwidth	Uplink	Uplink: Set full duplex bandwidth for uplink Ethernet port，actual bandwidth should be higher than this value. Default 30000bps. Then data port bandwidth= Uplink bandwidth=Uplink bandwidth-E1 occupied bandwidth. Data: limit local Ethernet ports full duplex bandwidth. Then Uplink bandwidth=data port bandwidth+E1 occupied bandwidth.
		Data	
	Enable		Enable this E1 channel. Default: enable
	Destination IP		Remote end IP address；4 E1 line IP addresses can be set separately Default 192.168.1.3
	Timing Mode	Adaptive	Adaptive mode:E1 timing from remote E1 stream； Loop back mode:E1 timing comes from local E1 stream
		Loop back	

Parameters		Selections	Explanations
	Jitter Buffer	2~120ms	Jitter absorption buffer: worked with the link with bigger jitter, used to buffer the receiving packets. Coming packets buffer to eliminate jitter. Range：2~120ms。 Default 16ms
	From remote port		Select coresponding relation of local E1 ports to remote E1 port service.

Note: The sentence with underline is default settings.

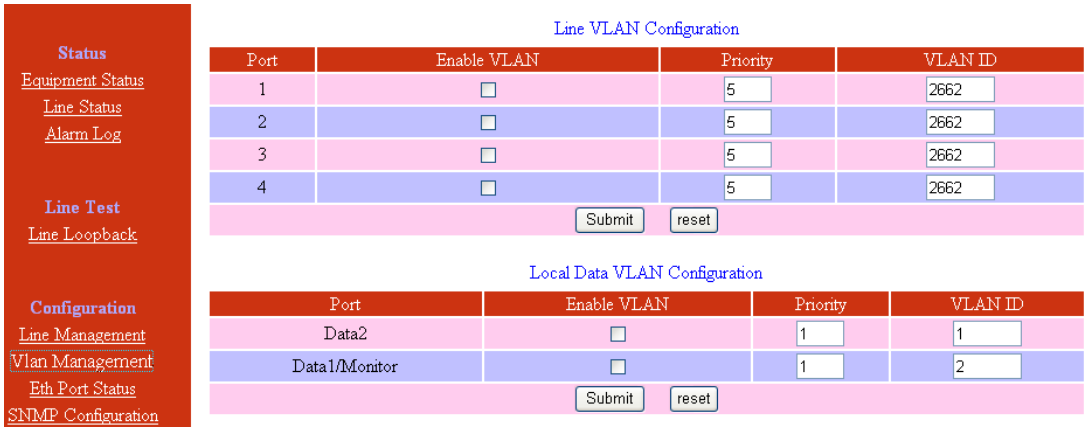


Fig.5.3-2 VLAN management

Table 5.3-2 VLAN management parameters

Parameters		Selections	Explanation
VLAN Management	E1 VLAN Configuration	Enable VLAN	Yes：with VLAN tag，support the VLAN network with priority to guarantee E1 QoS； (default)No：no VLAN tag
		Priority	Define users priority, including 8 levels (0-7), the number is bigger, the priority is higher. Default: 5
		Van ID	VLAN identify section, support 4096 VLAN identity. Range (0-4095). Default: 2662.
	Local Data VLAN Configuration	Data2	Add vlan tag in local Ethernet service packet, the selection is as E1 VLAN Configuration default: disable vlan, priority 0, valn ID:1
		Data1/ monitor	

Fig.5.3-3 Ethernet management

Table 5.3-3 Ethernet management parameters

Parameters		Selections	Explanation
Eth Port Status	Port		4 Ethernet ports status indication: Port: 4 Ethernet ports. Link: indicate current Ethernet link(Up/Down) Speed 10/100Mbps: indicate current Ethernet port speed Duplex: indicate current Ethernet work mode (half/full)
	Link		
	Speed 10/100Mbps		
	Duplex		
	Mode		4 Ethernet ports work mode configuration: adaptive (default) 100Mfull 10Mfull 100M half 10M half

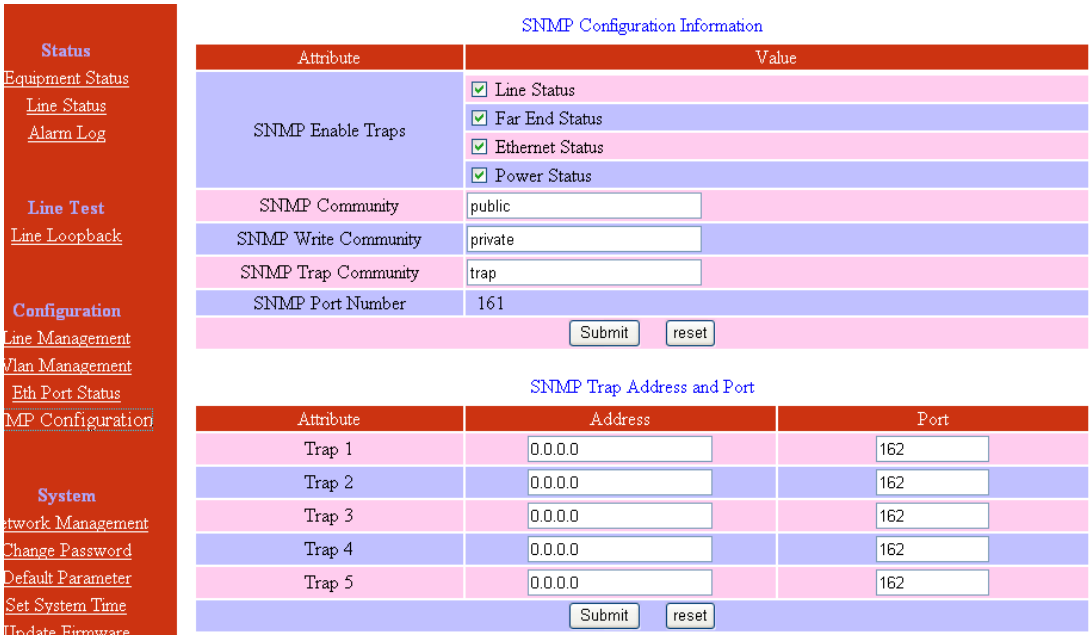


Fig.5.3-4 SNMP management

Table 5.3-4 SNMP management

Parameters		Selections	Explanation
SNMP Configuration	SNMP Enable Traps	E1 Line Status E1 packet Loss Ethernet Status Power Status	Enable/disable trap four alarms: 1.E1 line status（LOS and AIS） 2. E1 packets loss 3. Ethernet status（up or down） 4. power status Default selection status: should report the alarms initiatively.
	SNMP Community		Read equipment node information password（read only） Default: public
	SNMP Write Community		Managed equipment node information password default: private
	SNMP Trap Communit		Receive information Trap password. Default: trap
	SNMP Port Number		The communication port of equipment and SNMP management, the default SNMP port is 161

Parameters		Selections	Explanation
	SNMP Trap Address and Port	SNMP Trap Address SNMP Trap Port	Configure to equipment address and port number that received Trap information Set 5 address and ports at best, that is the managed ports can send Trap information for 5 managed equipment at best. SNMP Trap Address: need to be configured in the first time, (initialized: 0) but it can be saved and resumed. SNMP Trap Port: default is 162 , also can be saved and resumed

5.3.2 Service configuration indication

1、The actual output rate should correspond to the transmission bandwidth. If the transmission bandwidth is smaller than actual uplink rate, E1 errors will occur. So we set the maximum bandwidth of uplink line. When the uplink is higher than actual E1 rate, the difference value is Ethernet access rate. When the uplink is lower than actual E1 rate, the Ethernet rate is 0.

For example：The transmission line can provide 6M bi-direction bandwidth. If we use two E1 channels, the local uplink should be set smaller than 6M.If not, the actual rate may be higher than the transmission bandwidth. E1 errors may occur. In addition, sometimes the Ethernet bandwidth is given by half duplex, such as 10M half duplex Ethernet bandwidth is about 5M in full duplex.

2、Bandwidth auto adaptation for E1 depends on the connection of E1.If there is no signal loss for E1， system will allocate bandwidth for it. When E1 port is free, bandwidth will be released, which can be used for local Ethernet access.

3、The MAC address of MX-120 is fixed in the device. ARP is supported and the remote end MAC address can be got through auto-negotiation. So it is unnecessary to set the MAC address for the remote end, but IP address is needed.

NOTE：Each device should have only one MAC address in the multicast area!

4、in order to improve the E1 data transmission service quality, according to Ethernet provided transmission support IEEE 802.1Q and 802.1por not, H0FL-EthMuxV804 can set whether to add VLAN tag with priority in the encapsulate process. According to 802.1Q/802.1p standard to packing, the encapsulation overhead is bigger (more 4 bits is added in each Ethernet packet), but it also can be transmit according to priority level. But to the network which doesn't support 802.1p, it is no sense to set VLAN but increase unnecessary bandwidth, so here should set VLAN to NO.

5.4 Network configuration

The system configuration includes network configuration, change password, default parameters settings, save parameters and reboot the equipment. The interfaces are shown as below.

5.4.1 Network Management

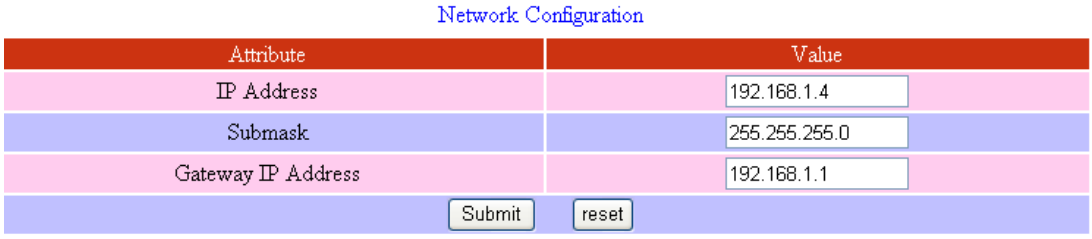


Fig 5.4-1 network configuration system

Table 5.4-1system network management parameters

Network Management	IP Address	The equipment IP address; default 192.168.1.2
	Sub mark	It is used to judge the resource and destination IP is in one subnet or not, please and the resource and destination IP address by bit, they are in one subnet if the result is same, otherwise, they are in different subnet, should use gateway router; default 255.255.255.0.
	Gateway IP Address	If resource and destination is not in one subnet, gateway IP address should be set, and gateway address should be in the same subnet with resource equipment. ARP is used to get address. Default 192.168.1.1

5.4.2 Change password

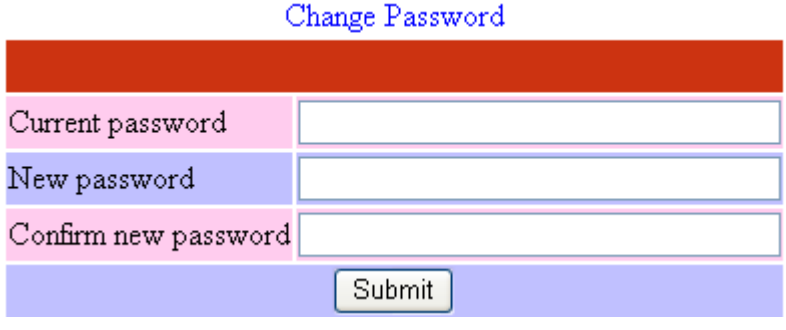


Fig 5.4-2 change the password

The change will be valid after confirm the submitting.

5.4.3 *Default parameter*

Default parameter recovery
This operation will recovery default parameter.
It will be applied after you reboot system!
Confirm

Fig 5.4-3 default parameters recovery 1

Confirm whether to recover default or not.

Fig 5.4-4 default parameters recovery 2

5.4.4 Set system time

Fig 5.4-5 set system time

Click ‘get localtime’ to obtain current time from PC. Then click ‘Set time to device’ to confirm this time. The time in Alarm Log will be changed according to current time. (Note: the time should be set again after restart)

5.4.5 Upgrade online

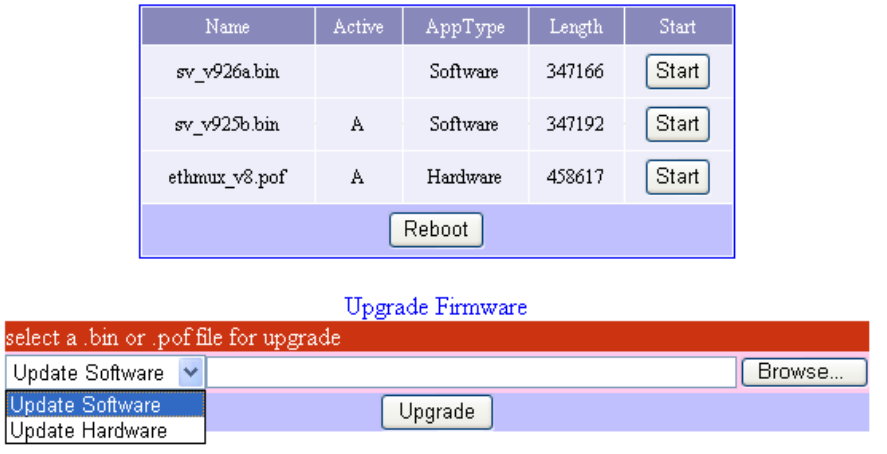


Fig 5.4-6 Set system time

The equipment can save two different versions of software and hardware. In above picture column, Name indicates program titles, the letter A under Active means the corresponding program is active. And there are two kinds of program type: hardware and software. Length shows their sizes. Click the button 'start' behind to run the programs.

Select Update Software or Update Hardware as above picture to upgrade the different software, and then click Browse to choose the update program file, click Upgrade, the upgrade work will be performed. Prompt information will pop up to show the upgrade is successful or not when finished. After the equipment upgrade and restart normally, enter the Upgrade Firmware menu again, perform reboot, the equipment will run the update software automatically, the user also can click item Start followed to choose the start program.

5.4.6 Save parameter

Click reboot, restart the equipment, the default value will be valid.

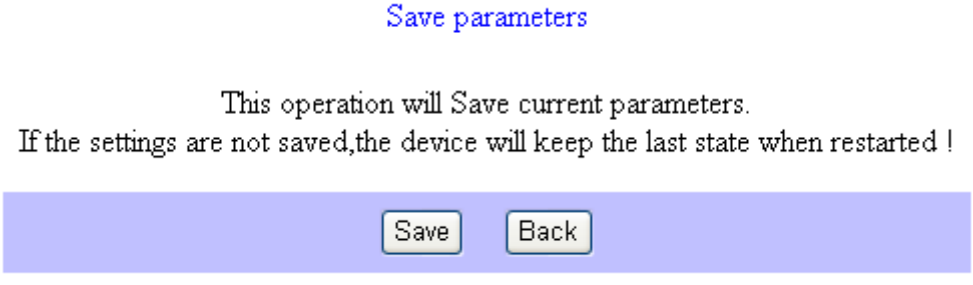

Save parameters
This operation will Save current parameters.
If the settings are not saved,the device will keep the last state when restarted !
Save
Back

Fig 5.4-5 saves parameters

5.4.7 Reboot system

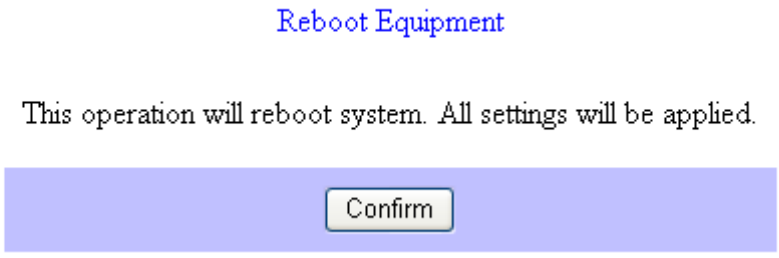


Fig5.4-6 Reboot equipment

6. 🕮Specification

6.1 Capacity

It supports four E1 ports, two 10/100Base-Tx uplink Ethernet ports and two 10/100Base-Tx local data Ethernet ports.

6.2 E1 interface

Comply with ITU-T G.703 recommendation

Four E1 Ports Supported.E1 port impedance E1-120Ω for twisted pair cables or 75Ω for coax (The RJ45 E1-120Ω are default for ports)

End-to-end delay (minimum delay setting) ≤ 10ms

Output frequency offset (adaptive timing, stabilized) ≤5 ppm

Output jitter (adaptive timing) ≤ 0.1UI

6.3 10/100Base-Tx port

Comply with IEEE 802.3

10M/100M Adaptive

Half/Full Duplex Adaptive

Support 802.1Q MAC

Uplink ports 1+1 backup supported

Two user data ports supported. And Web manager supported through anyone of two user data ports.

6.4 Power

AC： 100V~240V/50Hz (fuse: 1A)

DC： -38V ~ -62V (optional)

Power Consumption： ≤10W

6.5 Operating condition

Temperature: (0～50) ℃

Humidity: ≤90％ (non-condensing)

6.6 Dimensions

Width × Height × Depth： 440 × 44 × 231 mm

6.7 Weight

≤ 2.5 kg